

4.2 Depiction of Motion: Animation

Motion detection is a complex, resource intensive task that has strong evolutionary bindings right from serving as a trajectory estimator to a life detector. But our highly evolved motion detection system has also been exploited in the modern age from animation, to movies, to desktops and to visualizations. We can see some examples of how motion can be used to convey more information.

1. Motion as Cognitive aid

Various properties of motion can be used to reduce human cognitive load. For example, motion is used in modern desktop environments to facilitate lesser cognitive load. Starting from a basic effect of smoothly animating an application window's state when it is being maximized – minimized, motion is also used in more complex ways to emphasize causality. For example in application-modal dialog boxes (in Apple's OS for example when the dialog box from an application blocks only that particular application until further input from user), the association of the dialog box to the particular application is made through a smoothly animating the appearance of the dialog box to originate from the application. The reason that many users seem to prefer smoothly animated transitions – from windows to visualizations - might be because that animations facilitate smoother transitions in user's corresponding mental models.

2. Motion as Attention grabber

Motion, being a primary channel that attracts attention, can be put to multitude of uses in this area. McNamara et al. [1] in their work about 'Subtle Gaze Direction' mention how the peripheral vision is more sensitive to motion than the fovea. So if we needed to grab user's attention, we could do so even without changing the focus area of the user (usually the centre of the screen). We could use motion in a small area in the corner of the desktop that might end up triggering the peripheral vision's motion detection. But, in the focus area or not, it will end up annoying the user nevertheless if it is not warranted. To mitigate this problem, we could classify notifications by their order of urgency and then use various properties such as angle, direction etc., to perceptually organize and order the groups. This could lead to a learning effect where the user maps a particular motion profile to a corresponding notification profile.

3. Motion as a Premonition agent

Williams [2] talks about a snap effect when animating anticipation wherein a sense of premonition is conveyed to the user in 1 to 3 frames. Though the user's conscious mind doesn't realize what it has seen, it seems that the information reaches the user. This aspect can be utilized in desktop notifications when the system has detected that something might be wrong, but is not sure of it. The system can then issue a snap effect warning lasting few frames, to raise the warning flag in user's mind, urging the user to be careful in whatever he/she is doing. The system can decide to issue a more visible warning to the user when it has more reliable data. For example, in terms of computer security when the system has reason to believe that the user's current action might lead to a compromise in security, it can issue a

37 snap effect warning. It can then follow-up with a visible warning when it is sure of it.

38 Thus motion can be used to reduce cognitive load, attract attention and even issue subtle premonitions.
39 But since motion carries so more weight in attracting attention than other channels such as colour,
40 luminance contrast etc., it must be used with care. We are all familiar with countless web
41 advertisements or the ill famed Microsoft Office Clippy that try to use motion to grab our attention but
42 end up distracting and annoying us instead. Motion also has social implications apart from being a
43 survival mechanism. Like all powerful tools, it can be put to good use if used carefully.

44 **References**

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